GEORGIA INSTITUTE OF TECHNOLOGY — OFFICE OF CONTRACT ADMINISTRATION

PROJECT ADMINISTRATION DATA SHEET

[x] ORIGINAL [ ] REVISION NO. _____

Project No. E-19-509 ENERGY — DATE 6/25/82

Project Director: Dr. D. W. Tedder — School/Lab ChE

Sponsor: DOE Argonne National Laboratory; Argonne, Ill. 60439

Type Agreement: Graduate Research Award dated 6/3/82

Award Period: From 6/1/82 To ~~5/31/83~~ 9/2/83 (Performance) 7/15/83 (Reports)

Sponsor Amount: $12,000 — Contracted through:

Cost Sharing: _____ ~~GTRI~~/GIT

Title: Richard G. Hubert's Masters Thesis Research on Nuclear Waste Management

ADMINISTRATIVE DATA — OCA Contact Linda H. Bowman x4820

1) Sponsor Technical Contact:

J. H. Kittel, Manager
Office of Waste Mgmt. Programs
Argonne National Lab.
9700 South Cass Ave.
Argonne, Ill 60439
312-972-6677

2) Sponsor Admin/Contractual Matters:

A. G. Nisius
Assistant Controller
Argonne Nat'l Lab.
9700 So. Cass Ave.
Argonne, Ill. 60439
312-972-6844

Defense Priority Rating: none — Security Classification: none

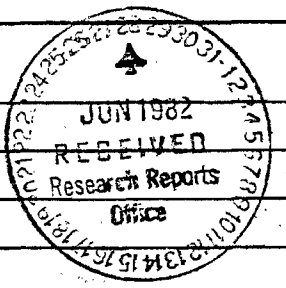
RESTRICTIONS

See Attached n/a Supplemental Information Sheet for Additional Requirements.

Travel: Foreign travel must have prior approval — Contact OCA in each case. Domestic travel requires sponsor approval where total will exceed greater of $500 or 125% of approved proposal budget category.

Equipment: Title vests with GIT

COMMENTS:



COPIES TO:

Administrative Coordinator	Research Security Services	EES Public Relations (2)
Research Property Management	Reports Coordinator (OCA) ✓	Computer Input
Accounting	Legal Services (OCA)	Project File
Procurement/EES Supply Services	Library	Other

GEORGIA INSTITUTE OF TECHNOLOGY OFFICE OF CONTRACT ADMINISTRATION

SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date April 10, 1984

Project No. E-19-509 School/~~XXX~~ Chemical Engr.

Includes Subproject No.(s) _____

Project Director(s) Dr. D.W. Tedder ~~XXXX~~ / GIT

Sponsor DOE Argonne National Laboratory; Argonne, Ill.

Title "Richard G. Hubert's Masters Thesis Research on Nuclear Waste Management"

Effective Completion Date: 5/31/83 (Performance) 7/15/83 (Reports)

Grant/Contract Closeout Actions Remaining:

- [ ] None
- [ ] Final Invoice or Final Fiscal Report
- [ ] Closing Documents
- [X] Final Report of Inventions
- [ ] Govt. Property Inventory & Related Certificate
- [ ] Classified Material Certificate
- [ ] Other _____

Continues Project No. _____ Continued by Project No. _____

COPIES TO:

Project Director
Research Administrative Network
Research Property Management
Accounting
Procurement/EES Supply Services
Research Security Services
Reports Coordinator (OCA)
Legal Services

Library
GTRI
Research Communications (2)
Project File
Other _____

Form OCA 60:1028

First Quarterly Progress Report
June - September 1982
E-19-509
"Acidic High-Level Liquid Waste Processing for Improved Management, Actinide Product Utilization and Fuel Safeguards"
Richard G. Hubert
Georgia Institute of Technology
D. William Tedder, Research Advisor

Emphasis this quarter was in the areas of synthetic waste preparation and synthesis and purification studies of the OϕO[IB]CMPO compound.

Processing the proper compounds for synthetic waste production has just been completed. Some investigation was done on the varying procedures for making the waste. The advice and methods from several different sources have been incorporated in order to try and improve the procedure to a higher degree of facility and consistent reproductability by reducing the sometimes ambiguous and complicated steps of the procedure to a minimum.

A couple of batches of OϕO[IB]CMPO was made and a third is underway. Difficulties were encountered upon the final purification steps such as decomposition upon distillation and failure to recrystallize. Thus recently more emphasis has been put on evaluating alternative purification techniques such as column chrom systems and solvent systems for recrystallization. No enlightening results have been obtained yet.

In the near future the waste solutions will be made fresh and flow sheets tested on the centrifugal contactor with, hopefully, completely pure OϕO[IB]CMPO as well as the dihexyl - N, N, - diethylcarbamyl methylene phosphonate sent to us by The Idaho National Engineering Lab. Evaluations are being made to determine the feasibility of doing in house analysis of the extractants with the Inductance Coupled Plasma Atomic Emission Spectronomer here at Georgia Tech.

Second Quarterly Report
October - December 1982
E-19-509

"Acidic High-Level Liquid Waste Processing for Improved Management, Actinide Product Utilization, and Fuel Safeguards"

Richard G. Hubert
Georgia Institute of Technology
D. William Tedder, Faculty Advisor

Emphasis this quarter was in the areas of preparing synthetic waste solutions and preparing adequate quantities of the n-OϕD[IB]CMPO for flow sheet studies.

All of the stock solutions for synthetic waste have been prepared. Dissolution of U_3O_8 is presently underway to obtain uranium for the flow sheet studies.

Pure OϕD[IB]CMPO has been crystallized in small batches. I am still working to obtain higher yields of pure OϕD[IB]CMPO.

By January 1, we plan to begin flowsheet testing with the DHDECMP solvent on the centrifugal contactor.

Third Quarterly Report
January - March 1983
E-19-509

"Acidic High-Level Liquid Waste Processing for Improved Management, Actinide Product Utilization, and Fuel Safeguards"

Richard G. Hubert
Georgia Institute of Technology
D. William Tedder, Faculty Advisor

The current effort is focused on compiling distribution data and evaluating analytical procedures for modified two phase systems using TBP as the modifier and DHDECMP as extractant. Isopar-L and Norpar-12 (Exxon TM) are the diluents being investigated. The diluent previously used, diethylbenzene, was found to be undesirable in an industrial environment. The Norpar-12 is currently used at Savannah River. Replacement of DEB with either Isopar-L or Norpar-12 will make the bifunctional extractant systems more attractive for large scale use.

We expect to complete the initial tests in mini-mixer-settlers within the next few weeks.

Fourth Quarterly Report
April - June 1983
E-19-509

"Acidic High-Level Liquid Waste Processing for Improved Management, Actinide Product Utilization, and Fuel Safeguards"

Richard G. Hubert
Georgia Institute of Technology
D. William Tedder, Faculty Advisor

Currently our research is focused on flowsheet testing and accumulating data. Several runs have been successfully completed for the 1A extraction cycle.

Studies are being conducted on the lanthanide strip cycle and the uranium strip cycle. Ammonium formate and formic acid solutions are among those being investigated for the uranium strip solution. Hydroxylamine nitrate has been found adequate for the lanthanide strip cycle.

Analytical procedures for uranium and neodymium concentrations in the organic phase are being developed. These analyses will enable us to greatly improve the quantity and quality of our experimental observations.

Fifth Quarterly Report
July - October 1983
E-19-509

Acidic High-Level Liquid Waste Processing for Improved Management, Actinide Product Utilization, and Fuel Safeguards

Richard G. Hubert
Georgia Institute of Technology
(D. W. Tedder, Faculty Advisor)

During this period, flowsheet testing of the 1A, 1B, and 1C extraction cycles were successfully completed using uranium and neodymium in our mini-mixer-settlers and high-speed centrifugal contactors. The organic-to-aqueous flowratios were varied over ranges which were sufficient to establish conditions for essentially 100% Nd extraction in the 1A cycle and nearly complete Nd stripping in the 1B cycle.

This study suggests that Purex dissolver solution can be successfully partitioned using this solvent system (a mixture of TBP and CMP in ISOPAR-L). Remaining questions to be answered include measurement of fission product decontamination of the 1A extract and the ability to perform the trivalent actinide/lanthanide separation using this same neutral extractant.